

Fig. 1 of 20

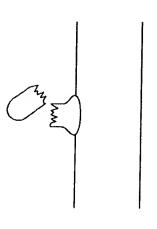


FIG. 1A

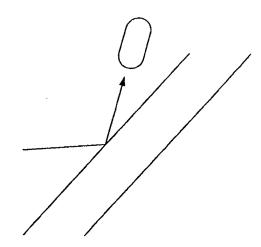


FIG. 1B

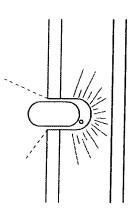


FIG. 1C

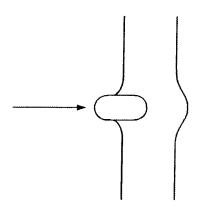


FIG. 1D

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TEST		TARGEI	T:		AREAL	FS ^B : B	AREAL FS ^B : BEFORE IMPACT FS: AFTER PENETRATION	ACT	FS: AFTER	PEN	ETRA	TION	SPECIFIC
NO.	MATERIAL(S) (YARNS/IN.)	MESH (YARNS/IN.)	THICKNESS NO. OF (G/CM^2) MASS VELOCITY K.E. VELOCITY K.E. K.E. LOST ABSORBED C (G/CM^2) (G/CM^2) (G/CM^2) (G/CM^2) (G/CM^2) (G/CM^2)	NO. OF PLIES	(G/CM ²)	IMASS (G)	VELOCITY (M/S)	K.E.	VELOCITY (M/S)	K.E.	K.E.	(%)	ABSORBED ^C (J/G/CM ²)
20	ZYLON	30X30	≈0.006	-	0.0130	25	79	78	61.5 47.5 30.5	47.5	30.5	39	2346
97	ZYLON	30X30	≈0.006	1	0.0130	25	82.5	85	63	49.5	49.5 34.5 41	41	2654
23	NOTKZ	30X30		1	0.0130	25	80	80	35.5 ^F	20 ^F	20 ^F 60	75	1366
	UHIMW PULYETHYLENE FELT	HYLENE FELI	≈0.13	-	+0.0309								
22	NOTKZ	30X30	≈0.006	1	0.0130	25	82	84	DID NOT G	7	84	100	≥1123
	UHMW POLYETHYLENE FELT	HYLENE FELT	≈0.13	2	+0.0618				PENETRA	7.			•

B FS MEANS FRAGMENT SIMULATOR.
C SPECIFIC ENERGY ABSORBED (SEA) IS DEFINED AS ENERGY ABSORBED PER UNIT AREAL DENSITY.
F THE IMPACTOR DID NOT PENETRATE THE FELT; HOWEVER, THE IMPACTOR, SURROUNDED BY THE FELT LAYER, COMPLETELY PENETRATED THE FABRIC.
G ONLY PARTIAL PENETRATION WAS OBTAINED IN THIS TEST-THE IMPACTOR, SURROUNDED BY THE FELT, REMAINED LODGED IN THE HOLE IN THE FABRIC.

Perkins Coie LLP (650) 838-4300

Title Penetration And Fire Resistant Fabric Materia And Structures

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, ES/		IARGET	13		AREAL	. B .			FR. AFTER DENIETDATION	DEA	LTDAT	11011	Christin
NOA	MATEDIALION		201111	-	DENSITY	15.	FS -: BEFORE IMPACT	PACT	7	11 7 21	בוששו	₹ 2	SPECIFIC
<u> </u>			IHICKNESS		2	MASS	VELOCITY	K.E.	MASS VELOCITY K.E. VELOCITY K.E. K.E. LOST	K.E.	K.E.	1007	ABSORBFDC
		(TARNO/IN.)	(TARNS/IN.) PEH PLY (IN.)	PLIES	(G/CM^{-})	9	(S/M)	3	(S/M)	3	3	(%)	(1/G/CM2)
13	ZYLON	45X45	≈0.011	-	0.0210	25	7.8	32	1	70,	770	Ì	/ "D/D/D
100	NOIX	ASYAS	~0.011	C	20,00	2 2		2	63	0.0/	00.0	gg	7990
200		00000	~0.011	7	0.0438	52	113	160	64	51.5	51.5 108.5	89	2477
07	NOT/7	30X30	≈0.006		0.0130	25	79	28	61.5	47.5	30.5	33	2346
9	7YLUIV	SUXSU	≈0.006	_	0.0130	25	82.5	85	6.3	49 5	1	1	25.7
52	ZYLON	35X35	≈0.0075	1	0.0158	25	77.5	75	50	12.5	- 1		2024
24	MOIA	ADXAD	000 U≈	-	0 04 0	3	5.7	2 5	55	ر ان	- 1	- !	ر3/3
90	7/104/	04.704	0.003		0.0100	S	6/	8/	49.5	30.5	48.5	9	2622
63	71.011	40740	≈0.009	4	0.0740	96	29	300	27.5	36.5	36 5 2635	88	3560
32	NO7k7	40X40	≈0.009	9	0.111	96	79	300	TON GIG	7	300	100	2702
	1,07,7	00,000							PENETRATE	TEE)) }	100
ć	NO747	30X30	900.0≈	~	0.0130	25	80	80	25 EF	Jou	09	75	
S	UHMW POLYETHYLENE FEIT	THYLENE	≈0.13	1	+0.0309				55.55	.nz	})	
	אוטוא	OCADO											
	717071	30,430	≈0.006	_	0.0130	25	82	84	9	,	84	100	
77	UHIMW POLYETHYLENE	THYLENE	≈0.13	2	+0.0618				ION OIG	7))	
	FELT	L							PENETRATE	TEO			

 $^{ extsf{A}}$ TESTS 13 AND 19 WERE PEHFORMED AND REPORTED DURING THE PREVIOUS REPORTING YEAR.

B FRAGMENT SIMULATOR.

^C SPECIFIC ENERGY ABSORBED (SEA) IS DEFINED AS ENERGY ABSORBED PER UNIT AREAL DENSITY.

D DATA FROM THIS TEST ARE QUESTIONABLE DUE TO THE EXCESSIVE PITCH, DEBRIS FROM THE ALUMINUM HONEYCOMB MOMENTUM TRAP TRAVELING AHEAD OF THE IMPACTOR, AND SOME PBO FIBERS FROM THE BACK (22° ORIENTATION) LAYER BREAKING AT THE CORNER OF THE CLAMPING ROD, AND THUS LIKELY REDUCING THE ABSORBED KINETIC ENERGY.

 $^{\it E}$ the impactor penetrated only the first of the six layers.

^F THE IMPACTOR DID NOT PENETRATE THE FELT; HOWEVER, THE IMPACTOR, SURROUNDED BY THE FELT LAYER, COMPLETELY PENETRATED THE FABRIC.

^G ONLY PARTIAL PENETRATION WAS OBTAINED IN THIS TEST-THE IMPACTOR, SURROUNDED BY THE FELT, REMAINED LODGED IN THE HOLE IN THE FABRIC.

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	2	.			-			-T	_		T -	.
SF4	MO/D/r)	300	782	286	1244	2441	858	2348	758	3350	579	1538
PER BROKEN	YARN	0.07	0.35	0.34	0.29	2.22	0.19	2.26	0.22			
يريج	િ	5	25	23	20	78	14	75	12	107	6	49
WORK DONE	(IN-LB)	45		208	174		120	1	106	943	81	433
YARNS BROKEN		33+38=71	35+36=71	32+37=69	26+42=68	2+33=35	29+41=70	2+31=33	1+53=54			
MAXIMUM	NODULUS (IB/IN)	742	2545	1778	954	1585	829	1301	1127	1773	974	1475
	10AD (1B)	55	634	484	277	909	214	478	288	287	569	532
1ST YARN BREAK FAILURE	SIMUKE - III (IN.)	0.757	1.035	1.023	1.330	≈2.70	1.232	≈2.70	1.051	=3.4	0.767	>2.2
IBREAK	<u>6</u> 89	153	493	400	260	398	214	463	288	388	240	377?
1ST YARI	STROKE (IN.)	0.488	0.697	0.672	0.687	0.781	0.612	0.834	0.667	0.764	0.572	0.792?
DATA	(MS)	10	10	10	10	10	10	10	10	10	10	10
	(IN./S)	0.075	0.075	0.075	0.075	0.075	0.075	0.075	0.075	0.075	0.075	0.075
PENETRATOR	ORIENTATION	45°	$\frac{45^{\circ}}{0.0 \times 10^{\circ}} = 0.0$		45°	45° 0.0	45°	45° 0.0 L DENSITY = 0.0318		OENSITY =	0	$\begin{array}{c c} 25-6 FS.SH & 0.07 \\ \hline 70 TOTAL AREAL DENSITY = 0.0318 \end{array}$
	TYPEB	29-G FB	29-G FB TOTAL ARFAL	12/	29-G FB	29-G FB TOTAL AREAL	ROL	.0 ROUNDED FB TOTAL AREAL	29-G FB	29-G FB TOTAL AREAL	25-G FS-SH	25-G FS-SH TOTAL AREA
NO. DENSITY GRIPPED EDGES A	(G/CM^2) NO. YARNS: (IN.)	4 W&F 5.0	4 W&F 5.0 NOT GRIPPED	0.0158 4 W&F 5.0 0.0080 NOT GRIPPED	2 F 5.0	2 F 5.0 NOT GRIPPED	2 F 5.0	F 5 NOT GRIPPED	2 F 5.0	NOT GRIPPED	2 F 5.0	2 F 5.0 NOT GRIPPED
AREAL	(G/CM^2)	0.0158 4	0.0158 4 0.0160 A	0.0158 0.0080	0.0158	0.0158 2 0.0160 A	0.0158	0.0158 2	0.0158 2	0.0158 2	0.0158	0.0158 2 0.0160 A
NO.	PLIES	1	- 2		1	- 2	1	7	1	- 2	1	7
BRIC	(YARN COUNT)	4/23 ZYLON 35X35 WEAVE	4/23 ZYLON 35X35 WEAVE ZYLON FELT #2	4/28 ZYLON 35X35 WEAVE ZYLON FELT #2	4/29 ZYLON 35X35 WEAVE	4/30 ZYLON 35X35 WEAVE ZYLON FELT #2	5/7 ZYLON 35X35 WEAVE	5/7 ZYLON 35X35 WEAVE ZYLON FELT #2	5/13 ZYLON 35X35 WEAVE	5/14 ZYLON 35X35 WEAVE ZYLON FELT #2	5/20 ZYLON 35X35 WEAVE	5/20 ZYLON 35X35 WEAVE ZYLON FELT#2
	(1998)	4/23 2	4/23 2	4/28 2	4/29 2	4/30 Z	2/2 Z	5/7 2	5/13 Z	5/14 2	5/20	5/20 Z
/IDEO		>	>	>	>	>	>	\	>	>	>	>
TEST	į	P-22	P-23	P-26	P-28	P-29	P-30	P-31	P-35	P-36	P-37	P-38

A W = WARP YARNS; F = FILL YARNS.

 B FS=FRAGMENT SIMULATOR; FB=FAN BLADE

^C THE ANGLE BETWEEN THE DIRECTION OF THE WARP YARNS AND THE LONGEST DIMENSION OF THE PENETRATOR'S IMPACT END (e.g, THE BLADE DIRECTION).

D IESTS INVOLVE CONSTANT STROKE RATE TO COMPLETE PENETRATION, EXCEPT WHERE MARKED "C"(CYCLICAL LOADING) OR "I "(INTERRUPTED BEFORE FULL PENETRATION)

E DATA IS FOR COMPLETE PENETRATION, EXCEPT FOR INTERRUPTED TESTS (MARKED "1"), WHERE DATA IS AT MAXIMUM BEFORE INTERRUPTION.

 $^{\it F}$ equals the area under the load-deflection curve

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Perkins Coie LLP (650) 838-4300 Title Penetration And Fire Resistant Fabric Materia And Structures Serial No.: 09/544,357 Filed: 04/06/2000 Atty. Dkt. No.: 59501-8028.US01 Fig. 5 of 20 Load (N) 300 - 200 100 2.5 N. 0.6 Stroke (in.) Stroke (cm) (P23) Two Plies PBO Felt (Ungripped): $25 \text{ J Absorbed (SEA} = 782 \text{ J/g/cm}^2)$ (P26) One Ply PBO Felt (Ungripped): 23 J Absorbed (SEA = 987 J/g/cm^2) (P22) Nothing: 5 J Absorbed (SEA = 300 J/g/cm^2)

300

200

100

0

400

(q_I) peo₇

009

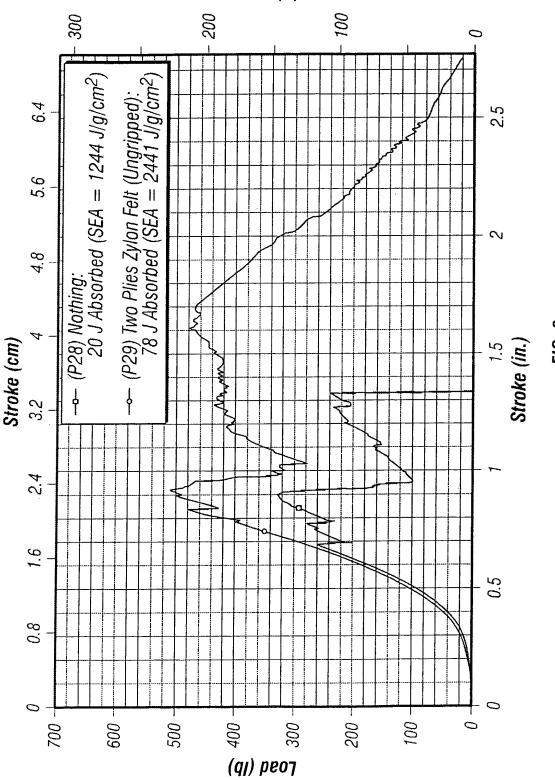
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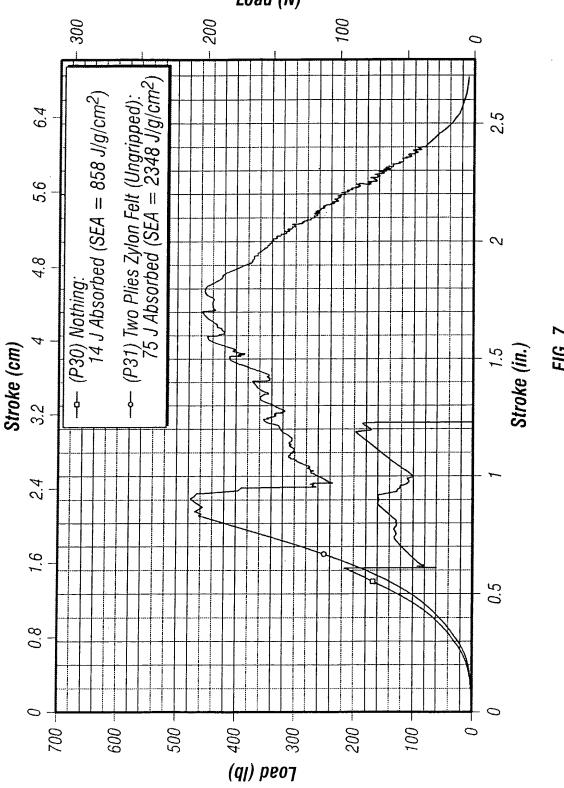


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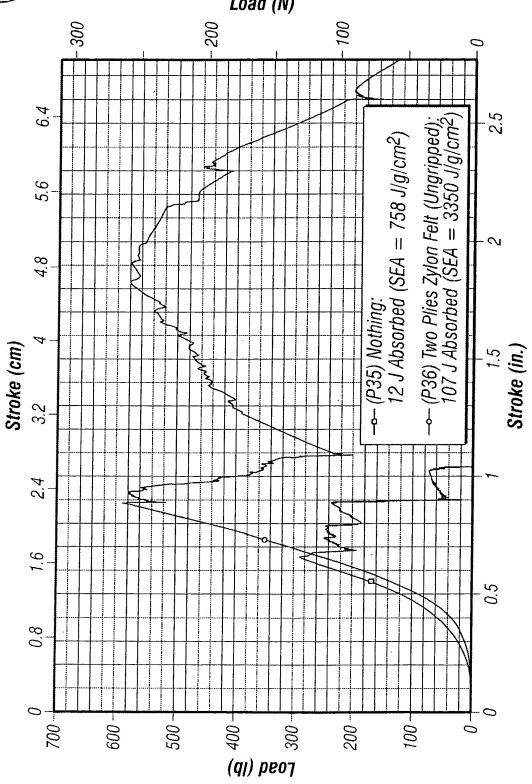




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F/G. 8



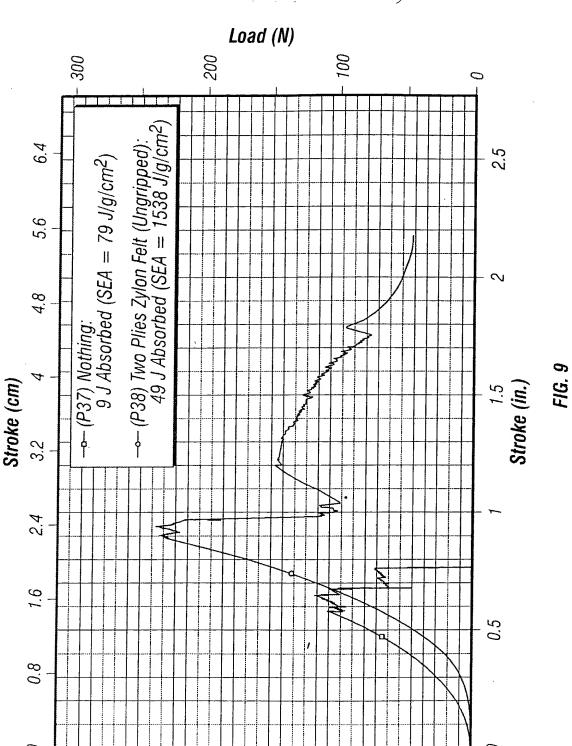
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Fig. 9 of 20



(al) beod (b)

300

200

100

0

200

009

500



Fig. 10 of 20

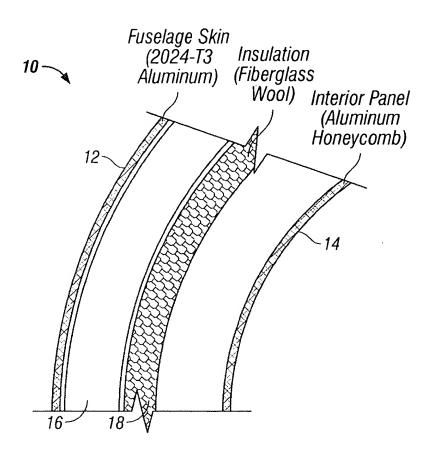


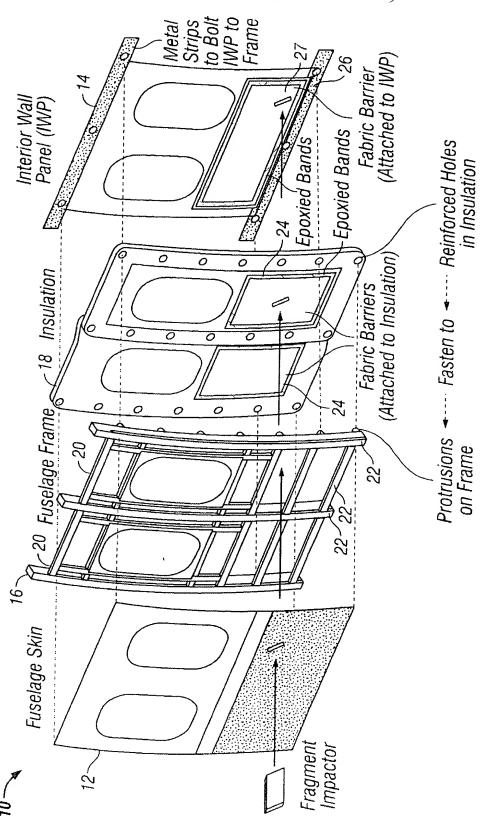
FIG. 10



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F/G. 11



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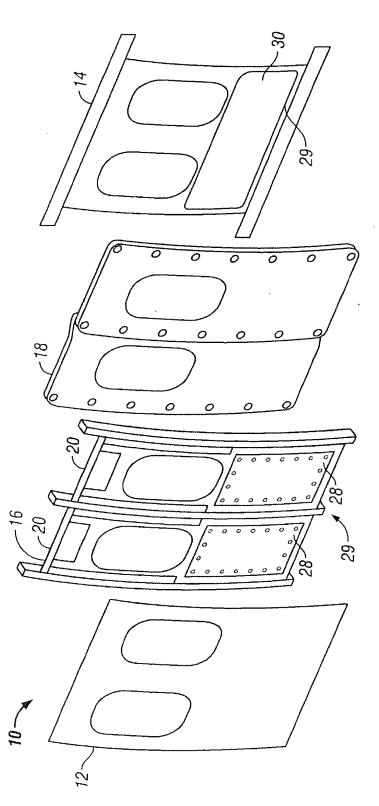




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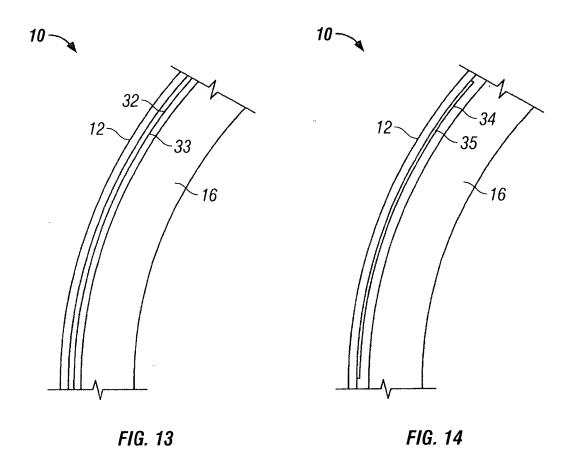




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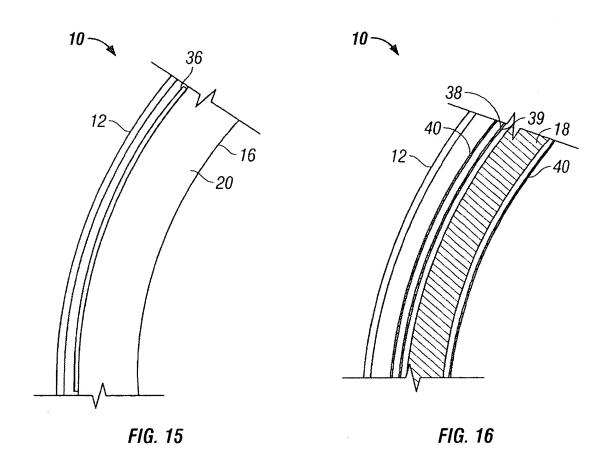




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10-

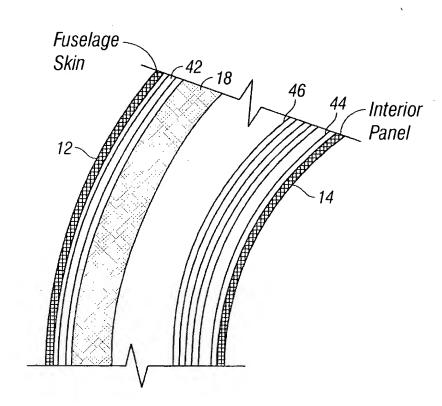


FIG. 17



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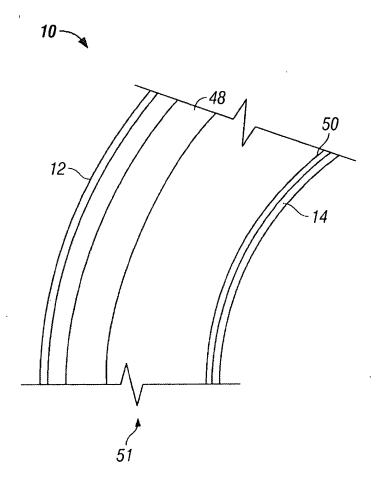


FIG. 18



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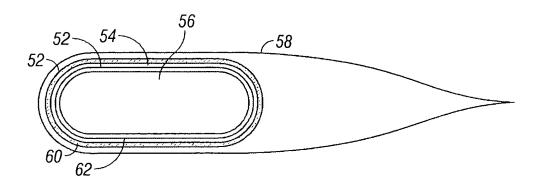


FIG. 19

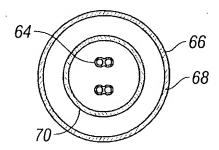


FIG. 20



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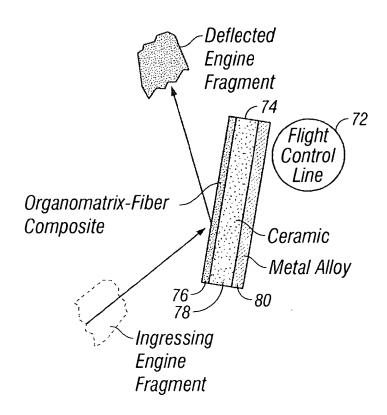
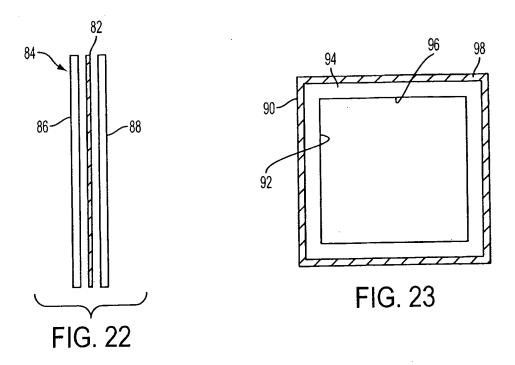


FIG. 21



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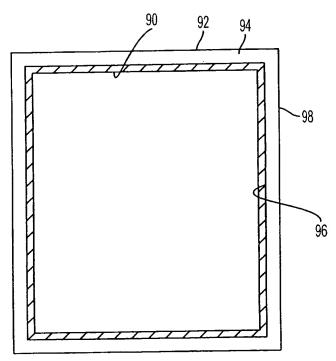


FIG. 24



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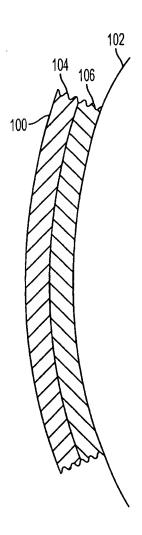


FIG. 25